

# COAL NONFATAL

UNITED STATES  
DEPARTMENT OF LABOR  
MINE SAFETY AND HEALTH ADMINISTRATION

DISTRICT 9

ACCIDENT INVESTIGATION REPORT  
(UNDERGROUND COAL MINE)

NONSERIOUS INJURY OUTBURST (BOUNCE)

Castle Gate Mine (ID No. 42-00165)  
Castle Gate Coal Company  
Helper, Carbon County, Utah

November 7, 1988

by

Lee H. Smith  
Supervisory Mine Safety and Health Specialist

Originating Office - Mine Safety and Health Administration  
P.O. Box 25367, DFC, Denver, Colorado 80225-0367  
John M. DeMichiei, District Manager

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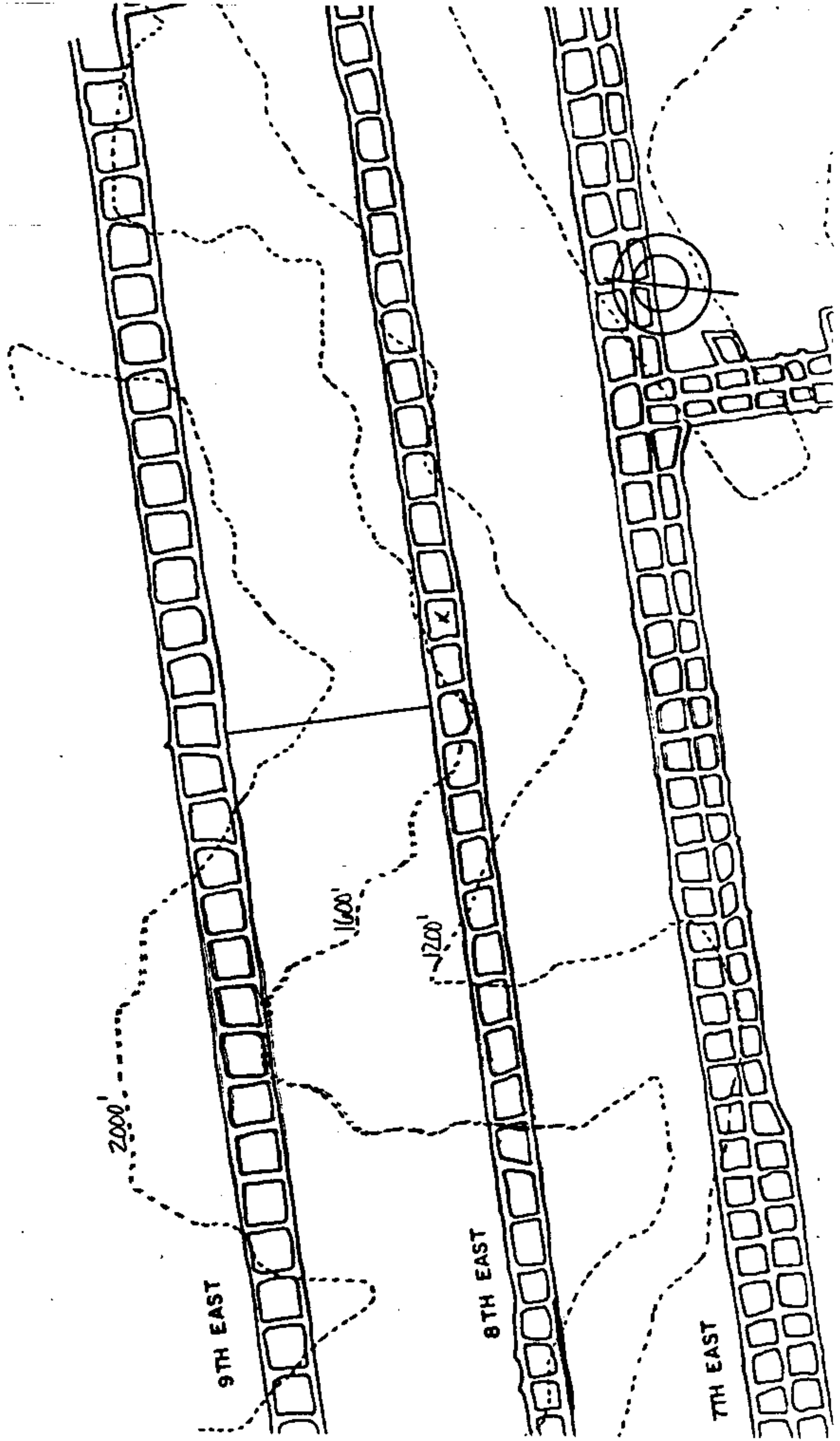
Legend

9th East Longwall face at time  
of accident

Shown are elevation contour lines

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**Authority**—This report is based on an investigation made pursuant to the Federal Mine Safety and Health Act of 1977, Public Law 95-173, as amended by Public Law 95-164.

**Section A—Identification Data**

1. Title of investigation:	2. Date MSHA investigation started:
Nonserious Injury Outburst (Bounce)	November 7, 1988
3. Report release date:	4. Mine:
12-02-88	Castle Gate Mine
5. Mine ID number:	6. Company:
42-00165	Castle Gate Coal Company
7. Town, County, State:	8. Author(s):
Helper, Carbon, Utah	Lee H. Smith

**Section B—Mine Information**

9. Daily production:	10. Surface employment:
2,900 tons	59
11. Underground employment:	12. Name of coalbed:
165	Sub 3 Seam
13. Thickness of coalbed:	
6 to 10 feet	

**Section C—Last Quarter Injury Frequency Rate (HSAC) for:**

14. Industry:	15. This operation:
16.78	14.37
16. Training program approved:	17. Mine Profile Rating:
4/19/87	N/A

**Section D—Originating Office**

18. Mine Safety and Health Administration Coal Mine Health and Safety District No. :	Address:
9	P.O. Box 25367, Denver, CO 80225-0367

**Section E—Abstract**

An outburst (bounce) accident occurred in tailgate area, between shields Nos. 115 to 121, of the 9th east longwall section at about 6:15 p.m. on November 7, 1988. The accident resulted in nonserious injuries to Leland Lovato, longwall foreman; Wade Norton, gas watcher; and Jim Smith, propman. All three were drilling a distress hole at shield No. 118 when the accident occurred. The distress hole is part of the Castle Gate Coal Company's stress relief program in which the outburst prone coal face is hydraulically fractured. The purpose of this breaking action is to relieve stress in a controlled manner. There was no equipment damaged. The miners were treated at the Castle View Hospital and released. They returned to the mine prior to the end of the shift.

**Section F—Mine Organization**

Company officials:	Name	Address
19. President:	Richard R. Clark	AMAX Coal Company 251 N. Illinois St., P.O. Box 967 Indiana, IL 46206-0967
20. Superintendent:	Chuck Burgraf	P.O. Box 449, Helper, UT 84526
21. Safety Director:	Tom Doane	P.O. Box 449, Helper, UT 84526
22. Principle officer—H&S:	Robert Evans	P.O. Box 449, Helper, UT 84526
23. Labor Organization:	U.M.W.A. District 22	P.O. Box 783, Price, UT 84501
24. Chairman—H&S Committee:	Roger McKinnon, Sr.	275 No. Carbon Ave., Price, UT 84501

### GENERAL INFORMATION

The Castle Gate Mine, Castle Gate Coal Company, is an underground coal mine located west of Helper, Carbon County, Utah, off U.S. Highway 50 and 6.

Presently, Castle Gate Coal Company, a subsidiary of AMAX Inc., operates one active underground coal mine in the sub 3 seam. The main access to the underground workings is through the main slope portal which is located in Hardscrabble Canyon. The coal is transported by conveyor belt through the Utah Fuel Portals located in Price Canyon.

The Castle Gate Mine was opened into the sub 3 seam in 1970 by Carbon Fuel Company. The mine was operated by Carbon Fuel Company until 1975 at which time Braztah Inc. assumed the property. In December of 1976, Price River Coal Company, a subsidiary of American Electric Power Company, acquired the property and operated the mine until May of 1986. At that time, the present operator, Castle Gate Coal Company, became the operator of the mine.

The main entries were developed in a northwest direction with the coal seam pitched from 10 to 13 percent. These entries are known as "The Northwest Mains (Dips)" section. Longwall panels were developed in a northeasterly direction at two to three percent pitch off of these entries. The west side of the mine was also developed and 3rd right, 2nd right, 3rd west, and 4th west were necked off and advanced a short distance. Main slope entries were developed off the west side and are known as "Main North East" and "Main North West" slopes. Two air shafts, a 26-foot diameter (intake) and a 20-foot diameter (return) were developed and intersect the Main North West (intake) and Main North East (return) entries. Two Joy Axivane fans are established over the intake shaft. The intake shaft is maintained as the main escapeway via a Nordberg Friction Hoist.

The principal mine officials on November 7, 1988, were:

Richard Clark	President
Chuck Burgraf	Superintendent
Tom Doane	Safety Director
Robert Evans	Mine Manager
Art Bruno	Maintenance Supervisor
Jerry Wright	Longwall Coordinator
Gilbert Madrid	Longwall Foreman (Graveyard)
Jerry DuBois	Longwall Foreman (Day)
Leland Lovato	Longwall Foreman (Swing)

The 9th east longwall face is 640 feet in length with a coal face height of 6 to 9 feet. The roof control and support for the longwall face is by longwall shields, roof bolts and mats, and timber supports. The longwall shield supports were manufactured by the Westfalia Corporation. There are 126 shields on the face. The 9th east longwall section had one 8-hour and one 4-hour production shift allotting four hours of the day shift to maintenance. The work schedule is five or six days a week, Monday through Saturday. The production and maintenance crews rotate between day shift (8:00 a.m. to 4:00 p.m.) and swing shift (4:00 p.m. to 12:00 a.m.) every two weeks. The graveyard shift is an idle shift.

At this time there are no other sections being developed; however, the Dips and 10th east sections are projected to be advanced. There are also long range projections for longwall development on the west side of the mine which is currently idled.

The mine employs 165 miners underground and 59 miners on the surface. On November 7, 1988, at the time of the outburst, there were 39 miners underground.

The average daily production is approximately 2,900 tons.

The last regular health and safety inspection at this mine was completed on September 29, 1988.

### DESCRIPTION OF ACCIDENT

At 4:00 p.m. on Monday, November 7, 1988, the seven member swing-shift crew under the supervision of Leland Lovato, longwall foreman, entered the mine. While on the surface, Lovato was told the working section was idled because of problems with the tibble and preparation plant. He was instructed to "drill holes and shoot emulsion" as part of the company's established stress relief program. The crew traveled to the 9th east longwall section in an Isuzu pickup, arriving about 4:25 p.m. They made one stop enroute to drop off Wade Norton, a gas watcher. Norton's job responsibilities required him to enter the longwall section via the tailgate entry.

After a 15-minute safety conference, Lovato examined the section and issued work assignments to the crew. Five of them were assigned maintenance work while Jim Smith, propman; Mark Pulhan, laborer; and Wade Norton were selected to assist Lovato in the destress drilling process. Smith and Pulhan traveled up the longwall face and met with Norton at the tailgate area. The electrical power was removed from the face equipment as this group assembled the equipment; i.e., drill, steel, and airlines at shield No. 97. A 2-inch hole was drilled to a depth of 16 to 17 feet in approximately 22 minutes. At this depth, in situ stress was intercepted as determined by a dramatic increase in cuttings, small popping sounds, and feel of the drill as the steel was quickly pulled into the coal face. The drilling was stopped and the steel was removed in an alternating push-pull fashion in an effort to remove all the cuttings and keep the hole clean. This serves to facilitate the insertion of high pressure hoses that are needed to accept and direct a high pressure emulsion infusion that hydraulically fractures the surrounding coal. This breaking action relieves the built-up stress in a controlled manner.

The men then moved uphill to shield No. 104 and began another drilling sequence. While drilling was in progress, Lovato arrived, relieved Pulhan, and assigned him other duties. The hole was drilled to a depth of 16 to 17 feet and cleaned. The group moved to shield No. 111 and repeated the process without incident. A hole depth of 18 feet was achieved. Arriving at shield No. 118, the drilling began after shields Nos. 118 and 119 were advanced to the face in order to reduce the amount of exposed roof.

At about 6:15 p.m., while drilling to a depth of 10 to 15 feet, the drilling suddenly became easier and with little or no warning an outburst occurred. The flying coal and rock filled the conveyor pan line to the top of the spill plates. Each man had his hands on the drill and was hit by the concussive forces of the outburst.

Smith was standing directly behind the drill and it is believed the drill was forced backwards at a high rate of speed and impacted on his chest. He was bent backwards over the cable trough toward the shield legs. His right leg from the knee down was pinned by rock and coal against the cable trough. He also received numerous facial cuts and abrasions.

Norton and Lovato were also pinned in the conveyor pan line. Lovato had received some facial wounds and a knee injury while Norton, who had his back to the face, complained of an ankle injury.

They pulled Smith to a standing position and were able to free him. He ran to a face phone and called for help. The rest of the crew were unaware that an outburst had occurred. They responded quickly and freed Lovato and Norton.

After completing an injury assessment, Lovato decided to call an ambulance and transport all the injured to the Castle View Hospital in Price, Utah. With assistance, the men walked down to the headgate, boarded an Isuzu pickup, and began to travel to the surface. On the way out of the mine, Smith lost consciousness. He was immediately treated for shock and regained consciousness in approximately one minute.

After arriving on the surface, the men were taken to the hospital by the Carbon County Ambulance service. They were treated and released. The men returned to the mine prior to the end of their shift.

The Price Subdistrict Office of the Mine Safety and Health Administration was notified and an investigation was started immediately.

#### PHYSICAL FACTORS INVOLVED

The investigation revealed the following factors relevant to the occurrence:

1. The coalbed in the 9th east longwall section ranges from 6 to 9 feet in height.
2. The 9th east longwall section was developed with two entries and connecting crosscuts. One headgate entry is used as a material haulageway and intake air course. The conveyor belt is located in the other. Both entries are designated and maintained as escapeways. A tailgate entry is maintained along the previously mined panel as a travelway and return air course.
3. The longwall assembly consists of 126 Westfalia 4-legged shields, a Halbrach and Braun armored face conveyor, and a Joy 3LS (dynatrac) shearer.
4. The Castle Gate Coal Company instituted a stress-relief program on October 27, 1988. This program consisted of drilling two-inch destress

holes and placing high pressure hydraulic hoses into them. These hoses were then charged with longwall emulsion fluid under high pressure, 2,500 to 4,200 psi, which served to hydraulically fracture the surrounding coal. This breaking action relieves the built-up stress in a controlled manner.

5. The 9th east longwall section is overlain by the No. 2 Mine, Royal Coal Company, abandoned since the early 1960's. The two mines are not vertically aligned. An interburden that ranges from 400 to 450 feet is composed of a predominantly strong sandstone member and separates the two mines. This member may dissipate some of the stress forces and minimize their effects on the lower seam.
6. Abrupt changes of topography had contributed to the stress load encountered in the 9th east longwall section. Steep canyon walls and sandstone cliffs predominantly figure in the surface area of the Castle Gate Mine.
7. Historically, this coal is prone to outbursts due to its energy storing capabilities. When subjected to stress and pressure, the coal tends to fail, sometimes violently, rather than to slowly yield.
8. Emulsion infusion holes were being drilled in the tailgate face area and entry. It is possible that holes previously drilled in the tailgate entry distributed the stress away from the infusion holes and caused some of the stress to travel toward the longwall face adding to the stress load present at the accident location.
9. The outburst (bounce) was of a low- to mid-range magnitude. This is a subjective scale adopted by those persons familiar with bounces at this mine based upon experience and accident evidence.
10. The stress relief program has lessened the severity of the outbursts (bounces).
11. All persons involved with the drilling process had been task trained.
12. Conflicting statements given by the three drillers did not allow a determination whether or not the actual drilling process triggered the event.
13. The outburst (bounce) accident involved an area 31 feet 6 inches long between shields Nos. 115 to 121.

#### CONCLUSION

The method of stress relief, emulsion infusion, being practiced in the tailgate entry could have unintentionally forced the abutment stress toward the already stressed retreating face. The cumulative effects resulted in an uncontrolled instantaneous release of energy accompanied by coal and rock.

The stress relief program is constantly evaluated by Coal Mine Safety and Health, District 9, the Denver Safety and Health Technology Center, and the U.S. Bureau of Mines. It is recognized that the program consists of

remedial and precautionary measures. Efforts are being taken to control stress in a long range manner, on a mine-wide basis through improved pillar and gate road design.

#### VIOLATIONS

Evidence and findings of the investigation indicated that there were no violations of Title 30 CFR which contributed to the occurrence of the accident.

Submitted by,

/s/ Lee H. Smith *slb*

Lee H. Smith  
Supervisory Mine Safety and Health Specialist

Approved by:

*John M. DeMichiel*

John M. DeMichiel  
District Manager

APPENDIX

The investigation was conducted by the Mine Safety and Health Administration and those persons furnishing information and/or present during the investigation were:

CASTLE GATE COAL COMPANY OFFICIALS

Richard Clark	President
Frank Sarno	Vice-President Employee Relations
Robert Evans	Mine Manager
Chuck Burgraf	Superintendent
Tom Doane	Safety Director
David Miller	Chief Engineer
Thomas McKenna	Project Engineer
Leland Lovato	Longwall Foreman

CASTLE GATE COAL COMPANY EMPLOYEES

Jim Smith	Propman
Wade Norton	Gas Watcher
Mark Pulhan	General Underground Laborer

REPRESENTATIVE OF THE MINERS  
UNITED MINE WORKERS OF AMERICA

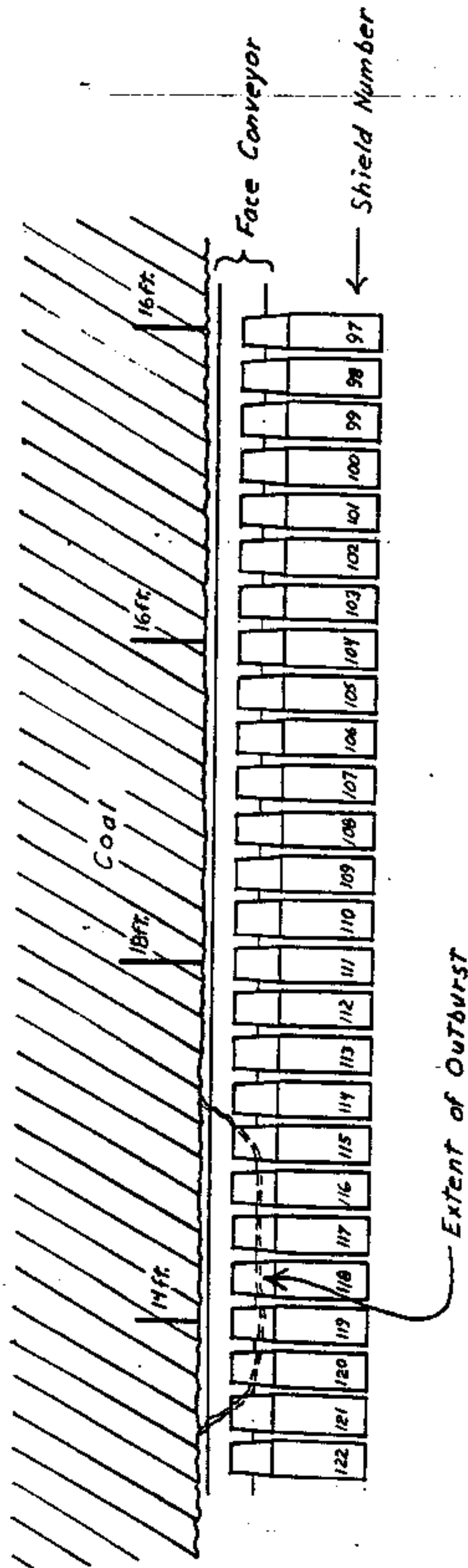
Robert Jennings	District 22 Safety Representative
Tom Barrington	President UMWA Local 8622
Roger McKinnon	UMWA Safety Committeeman
Lawrence Buckley	UMWA Safety Committeeman

MINE SAFETY AND HEALTH ADMINISTRATION

Jensen L. Bishop	Price Subdistrict Manager
Jack Matekovic	Supervisory Coal Mine Inspector
Lee H. Smith	Supervisory Mine Safety and Health Specialist
Lawrence Ganzer	Coal Mine Safety and Health Inspector
Allyn C. Davis	Mining Engineer
Billy Owens	Mining Engineer, Denver Safety and Health Technology Center



↑  
Direction of Retreat



Gob

Legend  
Not drawn to scale  
Accident (bounce) scene  
9th East Longwall Section

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